

transmitter channel spectrums 1720A-1720C, 1720F-1720K,
along with the outdoor FCC emission limitation 610
according to some embodiments. The frequency spectrum 1700
does not include the fourth and fifth channels with
5 frequency range from 5.075 GHz to 6.375 GHz. By no
transmitting the fourth and fifth channels, the
interference between the outdoors handheld UWB
communication devices and WLAN 802.11a lower and upper
bands can be avoided. This is because the WLAN 802.11a
10 lower and upper bands are in the frequency ranges from
5.150 GHz to 5.350 GHz and from 5.725 GHz to 5.825 GHz,
respectively. As a result, the interference can be avoided
between the outdoor handheld UWB and WLAN 802.11a by no
transmitting the fourth and fifth channels of multichannel
15 filter-based outdoor handheld UWB communication device.

While the present inventions have been described with
respect to a limited number of embodiments, those skilled
in the art will appreciate numerous modifications and
variations therefrom. It is intended that the appended
20 claims cover all such modifications and variations as fall
within the true spirit and scope of these present
inventions.

What is claimed is:

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1 1. A multichannel filter of the outdoor handheld UWB
2 communication transceiver comprising:
3 a digital FIR lowpass-shaping filter; or
4 a digital cascaded FIR filter including a digital
5 multiband FIR lowpass-shaping filter and a digital FIR
6 rejected lowpass filter generating an output ripple signal
7 magnitude about 61.8 (dBm) less than the normalized gain at
8 a frequency of 0.325 GHz.
9
10 2. The multichannel filter of claim 1 wherein said
11 digital FIR lowpass-shaping filter is only one single
12 filter that may be reused to generate all of the
13 multichannel signal with different multi-carrier
14 frequencies.
15
16 3. The multichannel filter of claim 1 wherein said
17 digital cascaded FIR filter is only one single filter that
18 may be reused to generate all of the multichannel signal
19 with different multi-carrier frequencies.
20
21 4. The multichannel filter of claim 1 wherein said
22 digital FIR lowpass-shaping filter may be used to produce
23 the scalability data rates with multi-carrier frequencies
24 for the multichannel-based outdoor handheld UWB
25 transceiver.
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27 5. The multichannel filter of claim 1 wherein said
28 digital cascaded FIR filter may be used to produce the
29 scalability data rates with multi-carrier frequencies for
30 the multichannel-based outdoor handheld UWB transceiver.
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32 6. The multichannel filter of claim 1 wherein the
33 outdoor handheld UWB transceiver may select either said
34 digital FIR lowpass shaping filter or said digital cascaded
35 FIR filter to produce the multichannel UWB signal with
36 scalability data rates.
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38 7. The multichannel filter of claim 1 wherein said
39 digital FIR lowpass-shaping filter and said digital
40 cascaded FIR filter is equivalently produce the same
41 transmitter function to meet the outdoor transmitter
42 spectrum mask.
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44 8. A digital FIR lowpass-shaping filter for outdoor
45 handheld UWB transmitter comprising:

46 a lowpass band 0 - 0.26 (GHz);
47 a first transition band 0.26 - 0.325 (GHz);
48 a second transition band 0.325 - 0.39 (GHz);
49 a third transition band 0.39 - 0.45 (GHz); and
50 a stop band 0.45 - 0.5 (GHz).
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53 9. The digital FIR lowpass-shaping filter of claim 8
54 wherein said digital FIR lowpass-shaping filter is only one
55 filter that may be needed in the use for the entire
56 multichannel.

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58 10. The digital FIR lowpass-shaping filter of claim 8
59 wherein said digital FIR lowpass-shaping filter may have
60 83-filter taps with odd symmetric and linear phase.

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62 11. The digital FIR lowpass-shaping filter of claim 8
63 wherein said digital FIR lowpass-shaping filter may be
64 programmable with scalability for transmitting UWB data
65 rates.

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67 12. The digital FIR lowpass-shaping filter of claim
68 11 wherein the outdoor handheld UWB transceiver may
69 transmit the UWB data onto the selected channel to avoid
70 the interference with WLAN 802.11a by using said digital
71 FIR lowpass-shaping filter.

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73 13. A digital cascaded FIR filter for outdoor
74 handheld UWB transmitter comprising:

75 a digital multiband FIR lowpass-shaping filter
76 that is generated by a digital enlarged FIR lowpass shaping
77 filter with inserting one zero into the between of two
78 filter coefficients; and

79 a digital rejected FIR lowpass filter.

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81 14. The digital cascaded FIR filter of claim 13
82 wherein said digital enlarged FIR lowpass-shaping filter
83 comprising:

84 a lowpass band 0 - 0.512 (GHz);
85 a first transition band 0.512 - 0.65 (GHz);
86 a second transition band 0.65 - 0.78 (GHz);
87 a third transition band 0.78 - 0.9 (GHz); and
88 a stop band 0.9 - 1.0 (GHz).

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90 15. The digital cascaded FIR filter of claim 14
91 wherein said digital enlarged FIR lowpass-shaping filter
92 has 51 filter taps with odd symmetric and linear phase.

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94 16. The digital cascaded FIR filter of claim 13
95 wherein said digital rejected FIR lowpass filter has
96 frequency bandwidths comprising:

97 a lowpass band 0 - 0.28 (GHz);
98 a transition band 0.28 - 0.7 (GHz); and
99 a stop band 0.7 - 1.0 (GHz).

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101 17. The digital cascaded FIR filter of claim 16
102 wherein said digital rejected FIR lowpass filter has 4
103 filter taps with even symmetric and linear phase.

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105 18. The digital cascaded FIR filter of claim 13
106 wherein said digital cascaded FIR filter may be
107 programmable with scalability for transmitting UWB data
108 rates.

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110 19. The digital cascaded FIR filter of claim 18
111 wherein the outdoor handheld UWB transceiver may transmit
112 the UWB data onto the selected channel to avoid the
113 interference with WLAN 802.11a by using said digital
114 cascaded FIR filter.